Neches Gas Plant — *Bob Wygant*

The Humble Way

MAY-JUNE, 1956

The Humble Way
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Humble Operations Are Reviewed At Annual Meeting of Shareholders

Morgan J. Davis is elected executive vice president by directors and Ed J. Hamner is elected to the Board of Directors

A REVIEW of Humble's operations in 1955 and the first quarter of 1956, presented by President Hines H. Baker, highlighted the annual meeting of the Company's shareholders, held on May 14 and presided over by Board Chairman J. A. Neath.

Mr. Baker noted that the higher net income of $174,997,500 in 1955 must be considered in the light of the heavy additional investments by the Company and of the higher cost of replacing crude oil production. He injected a similar note of caution in reviewing Humble's operations for the first four months of 1956, which were higher than in the same period of 1955. Specifically, Mr. Baker pointed out that, during the first quarter of 1956:

• The Company's net crude oil production increased more than 2 per cent over the same period of 1955, to an average of 379,000 barrels daily. Refinery operations, pipe line deliveries, and gasoline sales increased from 5 to 7 per cent compared with a year ago. The high level of operations was due in part to colder weather during the winter months.

• Net income was about $49,300,000, an increase of $3,500,000 over the same period a year ago. It is not expected that this level of earnings can be maintained for the year, however, because of a seasonal decline in production and refinery runs during the summer. For the year as a whole, petroleum demand is expected to increase between 4 and 5 per cent. As a result, operations for both industry and Humble are expected to be higher than last year.

• Exploration efforts, so far this year, have resulted in discovery of several promising fields and new reservoirs in old fields. The outlook for new oil reserves this year is encouraging, particularly in the offshore area where Humble has an active drilling program.

Mr. Baker also told the shareholders that Humble's capital expenditures for 1956 are estimated to be about $218,000,000, an increase of $7,500,000 over the previous record in 1955. These record expenditures will be principally for oil and gas producing facilities, and reflect the steadily rising cost of replacing crude oil production. In addition, he said exploration expenditures in the search for oil and gas, not included in capital expenditures, are estimated to be $91,800,000, of which about $44,700,000 will represent the cost of dry holes.

As a result of the veto of the Harris-Fulbright bill, Mr. Baker pointed out, the prices received by producers for gas sold in interstate commerce are still subject to regulation, although the Commission has not set any standards for price regulation. In these circumstances, gas producers are uncertain as to the prices they will receive on interstate sales; consequently relatively few such sales are being made. Humble has made some important intrastate sales of gas during the past year, but has made new sales of only small amounts in interstate commerce from three isolated fields where no local markets were available and immediate sales of gas were necessary.

Mr. Baker reminded the shareholders that petroleum imports continue to depart from the recommendation of the Cabinet Committee (that imports should increase no more than in pro-

Indian dwellings, such as this well-known Taos Pueblo, are among the many attractions which lure visitors by the thousands to New Mexico each year.

NEW EXECUTIVE VICE PRESIDENT

MORGAN J. DAVIS, Humble's new executive vice president, has been a vice president of the Company since 1951, and a director for the past eight years.

A native of Anson, Texas, Mr. Davis joined Humble in June, 1925, shortly after he was graduated from the University of Texas with a bachelor of arts degree in geology. His first job with the Company was as a geologist in the old Cisco Division. A few months later, he was transferred to Roswell, New Mexico, as geologist in charge of Humble's office there.

After four years of experience in New Mexico, Mr. Davis left the Company temporarily to do geologic work in the East Indies for Nederlandsche Koloniale Petroleum Mij. He returned to Humble in 1934 as district geologist for New Mexico, with headquarters again in Roswell.

Two years later, he was transferred to Houston and promoted to division geologist for the Gulf Coast Division. In 1940, he assumed the duties of chief geologist for the Company. When the old Geologic, Lease, and Scouting Department was reorganized into the Exploration Department, in 1946, Mr. Davis was made manager of the department in addition to his duties as chief geologist.

In 1948, he was elected to the Board of Directors, and three years later he was named a vice president.

Mr. Davis is a past-president of the American Association of Petroleum Geologists and is a member of the American Petroleum Institute's Committee on Reserves. He also is a member of the American Institute of Mining, Metallurgical and Petroleum Engineers, Texas Academy of Science, American Geographical Society, American Geophysical Union, Geological Society of America, Texas State Historical Association, Houston Geological Society, and Sigma Gamma Epsilon, honorary mineral science fraternity.

Morgan J. Davis

Humble's new executive vice president is also active in educational matters. He is on the Committee to Visit the Division of Geological Sciences at Harvard College, and is a member of the Alumni Advisory Committee on the Advanced Management Program at Harvard's Graduate School of Business Administration, a member of the Advisory Council of the Geology Foundation at the University of Texas, and a member of the Parents' Advisory Council of Washington and Lee University.

Operations Reviewed (Continued)

portion to domestic crude oil production) despite the efforts of some companies to comply with this recommendation. During 1955, he pointed out, crude oil imports increased 19.2 per cent, compared with a gain of 7.3 per cent in domestic production. And in the first quarter of 1956 crude oil imports were 14.4 per cent higher than a year ago, compared with an increase of only 5.7 per cent in domestic crude oil production.

Humble's plan to market through its Sales Department a new super-premium fuel to be known as Golden Esso Extra was also revealed to shareholders. (See page 9.)

The Company's president explained to shareholders that Vice President Morgan J. Davis is being elected to the office of executive vice president in order to share the load of general executive and administrative work and responsibility and to provide additional training and experience in this field. Mr. Davis will assist the president in the general administration of the Company's affairs.

"In this new post, his capacity, knowledge and experience will be capitalized to an even greater extent for the benefit of the Company," Mr. Baker said.

Ed J. Hamner was elected to the board to succeed Mr. Davis as the director in charge of Exploration. Mr. Baker said that Mr. Hamner "can bring to the board an experience and competence that will contribute greatly to the Company's progress."

The shareholders re-elected as directors: Hines H. Baker, J. A. Neath, Rex G. Baker, H. W. Ferguson, Morgan J. Davis, C. E. Reistle, Jr., Richard J. Gonzalez, H. P. Pressler, Jr., Ralph J. Schilthuis, and Ray H. Horton. Mr. Hamner was elected as a new director.

At the board meeting immediately following the shareholders' meeting, officers for the year were elected by the directors. Mr. Davis was elected executive vice president, Dick H. Gregg, an associate general counsel, and the other officers of the Company were re-elected.

Following is the complete list of officers elected: Hines H. Baker, President; J. A. Neath, Chairman of the Board; Morgan J. Davis, Executive Vice President; Rex G. Baker, Vice President and General Counsel; H. W. Ferguson, Vice President; C. E. Reistle, Jr., Vice President; Richard J.

A NEW MEMBER OF THE BOARD

ED J. Hammer, the new director in charge of Exploration, began his career with the Company as a summer employee while still an engineering student. Before his election to the Board of Directors this year he had advanced to assistant manager of the Exploration Department.

Mr. Hamner was born in Gainesville, Texas, and attended Texas A. & M. College for two years. He then transferred to the University of Oklahoma, where he received his bachelor of science degree in 1931, and his master of science degree in geological and petroleum engineering the following year. He was elected to Sigma Gamma Epsilon, honorary geology fraternity.

After graduation, he went to work in Humble's Production Department in the Thompsons District. He worked on rigs in various locations before becoming petroleum engineer for the Lake Washington District.

In 1934, Mr. Hamner was transferred into the Exploration Department, where he served as production geologist at Raccoon Bend, Anahuac, Amelia, Friendswood, and several other coastal fields. He became assistant to Humble's chief geologist in 1941, and three years later he moved to Corpus Christi as assistant division geologist for Southwest Texas. He returned to Houston in 1946 as assistant chief geologist for the Company.

When Humble began operations in California, eight years ago, Mr. Hamner was transferred there as manager of exploration. He was promoted to area manager of the California operations in 1952, and held that post until March, 1955, when he was moved back to the Houston office to become assistant manager of the Exploration Department.

Ed J. Hamner

The new board member is a registered professional engineer in both California and Texas. He is also a member of the American Petroleum Institute, the American Association of Petroleum Geologists, and the American Institute of Mining, Metallurgical and Petroleum Engineers.

Mr. Hamner was formerly a director of the Western Oil and Gas Association and a member of the association's wildcat committee. He was also a director, and is still a member, of the Los Angeles Petroleum Club and belongs to the Jonathan Club of Los Angeles.

Gonzalez, Treasurer; O. L. Luper, Controller; H. K. Arnold, Secretary and Assistant Treasurer; W. Nelson Jones, General Attorney; Carl Illig, Associate General Counsel; Dick H. Gregg, Associate General Counsel; J. R. Mulvey, Assistant Controller; W. J. Crawford, Assistant Controller; E. E. Hunter, Assistant Controller; Paul Millsapps, Assistant Secretary and Assistant Treasurer; B. P. Barrett, Jr., Assistant Secretary and Assistant Treasurer; I. D. Breedlove, Assistant Treasurer; L. W. Groce, Assistant Treasurer; Margaret W. Hatch, Assistant Secretary; Elizabeth H. Kenney, Assistant Secretary; Paul G. Norris, Assistant Secretary; T. C. Brunson, Cashier; O. E. Roesler, Assistant Cashier; J. F. Patten, Assistant Cashier; D. P. Fraser, Assistant Cashier.

NEW ASSOCIATE GENERAL COUNSEL

DICK H. GREGG, the Company's new associate general counsel* has been a member of Humble's Law Department since 1938.

Born in Marshall, Texas, he moved to Houston in 1920. After graduation from San Jacinto High School he attended Rice Institute for one year, then transferred to the University of Texas, where he received his B.A. and LL.B. degrees. At the University he was a member of the staff of the Texas Law Review, a member of Chancellors, Order of the Coif, and Phi Delta Phi legal fraternity.

Dick H. Gregg

Mr. Gregg practiced law from 1935 until he joined Humble's Law Department. He spent two years in the Trial Division, and transferred to the Contract and Title Section in 1940. Later, he handled Refining Department legal work, also stock transfer and annuity and thrift work for the secretary's office. In 1949, he became head of the Contract and Title Section, which handles legal work of the Exploration and Production Departments.

Mr. Gregg is a member of the American Petroleum Institute, the Houston Bar Association, and the Texas Bar Association.

* There are two associate general counsels; the other post is held by Carl Illig.

NATURAL GAS—Part I

ITS EXPANDING ROLE

BY RICHARD J. GONZALEZ*

NATURAL gas is a fuel in direct competition with coal and with fuel oils in residential, commercial, and industrial uses. It is also used to make carbon black. Natural gas consists principally of methane but usually has associated with it ethane, propane, butane, and other heavier hydrocarbons which can be extracted from it as liquids for use as fuels or for the manufacture of chemical products. It is technically feasible to convert methane into gasoline and chemicals, and also to liquefy it for transportation in barges or tankers. Some investments to test for commercial feasibility of these processes have been made, but without conclusive results to date. At present, gas is used principally as a fuel. In this use it has the advantage of being clean, well suited for use in automatic equipment, and efficient in combustion. It is usually transported by pipelines to consumers as required for immediate use since it is expensive to store.

The common standard for comparison of fuels is the British thermal unit (B.t.u.). By this standard, a thousand cubic feet (M.c.f.) of dry natural gas contain about a million B.t.u., although the heat content at the point of production of the gas including liquids is estimated by the Bureau of Mines at 1,075 B.t.u. per cubic foot. About 24 M.c.f. are equivalent in heat content to a ton of coal and about 5.4 M.c.f. are equivalent to a barrel of oil. By converting all fuels and water power into British thermal units, calculations can be made of the role of the principal fuels in supplying the energy requirements of the United States.

In 1955, energy consumption in the United States was nearly 40 quadrillion B.t.u., or about twice as much as in 1935. From 1935 to 1955, consumption increased about 10 per cent for coal, 200 per cent for oil, and 400 per cent for natural gas. Consequently, the role of coal in the energy market has dropped sharply, from 54.9 per cent in 1935 to 28.9 per cent in 1955, while that of oil and gas has increased to 43.4 and 24.0 per cent, respectively.

Marked changes have occurred in the consumption of gas by major users and by geographic areas. For many years most of the marketed production of natural gas was used near the point of production, principally in the Southwest, in field operations of the petroleum industry and in industrial activities near the point of production. Before the days of large diameter welded pipe, transportation of gas was relatively expensive and the geographic market was consequently rather limited. Large amounts of gas produced in connection with oil were flared for lack of markets because the cost of gathering, compression, and transportation exceeded the value that could be realized in markets distant from the area of production.

Improved pipeline technology and the availability of gas in the Texas Panhandle at extremely low prices resulted in construction of some long interstate pipelines to serve Colorado and some of the North Central states some twenty-five years ago. These supplies displaced manufactured gas and started the use of natural gas at considerable distance from the producing areas. It was not until after World War II, however, that the technology of transportation and the rising prices of other fuels made it attractive to build numerous long distance pipelines to serve customers in all areas of the United States.

The spectacular expansion in the use of gas has occurred in the past ten years, during which there was an average annual rate of increase of 10 per cent for gas and 5.5 per cent for oil compared with a decrease for coal. Rapid growth in demand for gas resulted from the construction of numerous large interstate pipelines from the producing states of the Southwest (Texas, Louisiana, Oklahoma, Kansas, and New Mexico) to all the important fuel consuming areas of the United States. Interstate transportation of gas increased from about 1.1 trillion cubic feet in 1945 to about 5 trillion cubic feet in 1955. Residential and commercial use of gas tripled, but all industrial uses increased also except that the amount of gas used to make carbon black declined. Residential and commercial customers now use one-third of the marketed production of natural gas, while the largest consumption con-

* Director and Treasurer, Humble Oil & Refining Company. Based on an address before the Southwestern Social Science Association at San Antonio, Texas, March 30, 1956.

E AS AN ENERGY RESOURCE

tinues to be for industrial purposes, with the other industrial uses exceeding those of the petroleum industry in the field and at refineries by an increasing margin. Half of the natural gas is still consumed in the state where it is produced.

Price Relations of Competitive Fuels

There is substantial evidence that the more rapid increase in the use of gas than of competing fuels has been due to its attractive price. Official government indexes of wholesale and retail prices show a smaller relative increase for gas than for other fuels since 1945. During the past ten years, the index of gas prices has increased at most about 20 per cent compared with gains of 50 to 80 per cent for other fuels. It is not surprising that the most rapid growth in demand has been for the fuel with the smallest relative increase in delivered price to wholesale and retail markets.

One indication of the attractive price of natural gas is the rapid increase in the number of residential users. There were about 22 million residential consumers of natural gas at the end of 1955, more than twice as many as in 1945. Meanwhile, there was a sharp decrease in the number of customers for manufactured gas because local distributing utilities found that natural gas was cheaper and better. About 14 million residences now use gas for space heating. Since space heating involves substantial expenditures for fuel, the large number of consumers using gas for this purpose suggests effective price competition as well as advantages for which a limited number of customers might be willing to pay substantial premiums.

Analysis of the charges for fuels delivered to residential customers shows that heating is cheaper with natural gas than with coal or oil in many cities, including some in the heart of the coal-producing area. This is quite significant in view of the high distribution cost for gas incident to meeting peak demands for winter heating. In some cities, accounting for a small proportion of the gas consumption, the cost of gas to residential users is higher than the cost of coal or oil. This is apt to be the case particularly where natural gas has only recently been substituted for manufactured gas and there is an unusually large distribution cost.* The fact that the distribution cost is high does not necessarily mean that the charge is unreasonable, for there are many circumstances involved in that question. But it does suggest that the complaint of consumers about the high price of gas in these cases may not be the result of the price paid for gas itself.

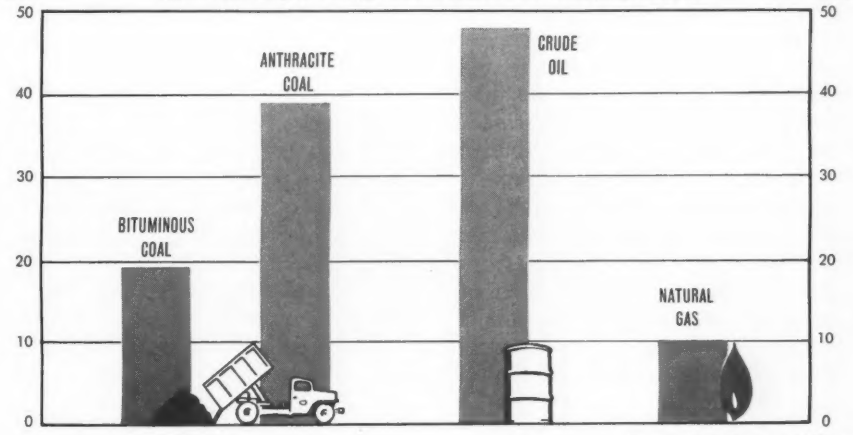
It is particularly important to note that the charges for delivery of fuels to residential customers cover three distinct items:

(1) The fuel itself,
(2) the transportation of the fuel from the point from production to the consuming area, and
(3) the distribution to the ultimate consumer.

If every fuel user were billed separately for the fuel itself and for the transportation and distribution charges in delivering it, there would no doubt be considerable surprise as to the relative role of the different items in the total and a much better understanding

* For example, for the gas delivered in Providence, Rhode Island, which first received gas from the Southwest in 1953, the cost of the gas was 10.57 cents in the field and 56.4 cents delivered to the city gate, but the typical residential consumer paid $1.59 per M.c.f. if he used gas for space heating and $3.55 per M.c.f. if he used gas only for cooking and water heating.

COMPARATIVE PRICES OF MAJOR FUELS FOR ONE MILLION B.T.U. AT POINT OF PRODUCTION



Source: U. S. Bureau of Mines

BACKGROUND FOR THE SITUATION

THE average price of natural gas at the point of production has approximately doubled in the United States and tripled in Texas since 1945. This rise has brought the average field price back up to the level prevailing in 1922. It still leaves gas as the cheapest fuel at the point of production, selling on the average for about one-half the cost of bituminous coal at mines and one-third the cost of residual fuel oil at refineries for the same heat content. Regardless of the relative price, the recent advance has attracted considerable criticism.

It has been argued that the rise in gas prices proves that competition is not effective and that government regulation of the price at which producers sell gas to interstate pipelines is necessary in order to protect captive consumers against gouging. That conclusion does not follow from the premise, since price can rise rapidly and sharply even under conditions of perfect competition. The argument has a strong emotional appeal, however, and it was used effectively in the recent debate over the Harris-Fulbright bill. This bill was designed to make it clear that the Natural Gas Act, passed in 1938 to regulate interstate gas pipelines, was not intended to apply to the producers selling gas for movement in interstate commerce.

The strange circumstances by which gas producers selling gas in interstate commerce find themselves subject to regulation as though they were public utilities would make an interesting paper in itself, apart from the subject under consideration here. As a background for the present situation, a few brief points may be noted:

- *First,* Section 1 (b) of the Natural Gas Act specifically stated that its provisions should not apply to the production or gathering of natural gas.
- *Second,* the Federal Power Commission, which was charged with administration of the act, has consistently held that it did not have jurisdiction over independent producers selling gas to interstate pipelines.
- *Third,* the intention of Congress was made ineffective as a result of interpretation by the Supreme Court that producers are subject to regulation under the Act as a result of *sales* to pipelines which move the gas in interstate commerce and later resell it, even though the producers are not engaged in "transportation *and* sale" in interstate commerce.
- *Fourth,* Congress has twice passed legislation approved by the Federal Power Commission to amend the Natural Gas Act in accordance with its original intention so that it would be clear beyond any doubt that it did not intend to regulate the price at which gas is sold to interstate pipelines.
- *Fifth,* this clarifying legislation did not become effective because it was vetoed. The veto by President Eisenhower was based on extraneous circumstances apart from the merits of the bill. Indeed, the President stated that legislation conforming to the basic objectives of the bill is needed because the type of regulation of natural gas producers required at present will discourage individual initiative and incentive to explore for and develop new sources of supply.

The present confused situation as to federal regulation over producers selling gas to interstate pipelines constitutes an important national problem. In the absence of federal regulation over gas producers, the consumption of natural gas in the United States has quadrupled since 1938. As a result, natural gas now supplies one-fourth of the energy used instead of one-eighth as it did in 1938 and even as recently as 1945. Unless past trends are interrupted by recent developments over sales in interstate commerce, which involve half of all the gas consumed, gas will become a more important source of energy than coal within the next five years.

These circumstances mean that the natural gas problem is of concern not only to the producers affected but also to the nation as a whole. This important problem should be decided on the basis of sound economics rather than of emotion or politics. An analysis and understanding of the fundamental forces of supply and demand affecting natural gas is essential to a proper solution.

on the part of consumers that their charges for gas represent principally costs of transportation and distribution that are subject to utility regulation.

On the average, utilities charge residential consumers about 85 cents per M.c.f. for natural gas; about 10 to 15 per cent of this represents the average price paid for gas itself. The cost of transportation through large interstate pipelines varies with distance and load factor, but is estimated to be about 1.5 cents per M.c.f. per hundred miles for large lines with high load factors. Depending upon distance from the point of production, the interstate tranportation may represent up to 30 cents per M.c.f. The remainder of the consumer's bill for natural gas, which is considerably more than half of the total, is for distribution from the point at which it is received by a local utility.

Evidence of the competitive price of gas is also provided by increasing industrial consumption, particularly the use by utilities in the generation of electric power. These utilities are extremely alert to differences in the cost of fuels and are usually equipped to use whichever is cheapest. The largest use of gas by electric utilities continues to be in the Southwest near the producing areas, but increasing quantities of gas have been used by electric utilities in recent years in areas at considerable distance from production, particularly in the North Central states. The utility use of natural gas for generation of electric energy has more than

tripled postwar and is now at the rate of about a trillion cubic feet annually. As a result, the proportion of all electric energy generated by gas has more than doubled and is now about 17 per cent.

It will not be exactly a surprise to economists that in the market circumstances prevailing for alternate fuels postwar there should have been an increase in the price of natural gas at the point of production. Exceptional circumstances of great discoveries of new gas supplies at low cost, contrary to the trend evident for other fuels, would have been necessary to prevent a rise in the price of natural gas in the face of the tremendous increase in demand. Official government statistics again provide evidence on the competitive prices of mineral fuels at the point of production. As of 1955, a million British thermal units could be bought at the point of production for an average of 10 cents in the case of natural gas, 19 cents for bituminous coal, 39 cents for anthracite coal, and about 48 cents for crude oil. Natural gas thus continues to be the cheapest fuel at the point of production despite a rate of increase roughly parallel to that of oil postwar.

In the period from the passage of the Natural Gas Act in 1938 until 1954, during which there was no federal interference with the field price of natural gas, the cost per million B.t.u.'s of heat content increased about 5 cents for natural gas compared with 12 cents for bituminous coal, 24 cents for anthracite coal, and about 30 cents for crude oil. In Texas, the average price per million B.t.u.'s for natural gas at the well increased from 2 cents in 1938 to 8 cents in 1955, an absolute gain slightly greater than the national average but a much larger relative gain because of the extremely low average price that prevailed for gas in Texas for about 20 years from 1927 to 1947.

An understanding of the behavior of gas prices in the field requires analysis of the forces affecting the supply of gas to be considered in the following section.

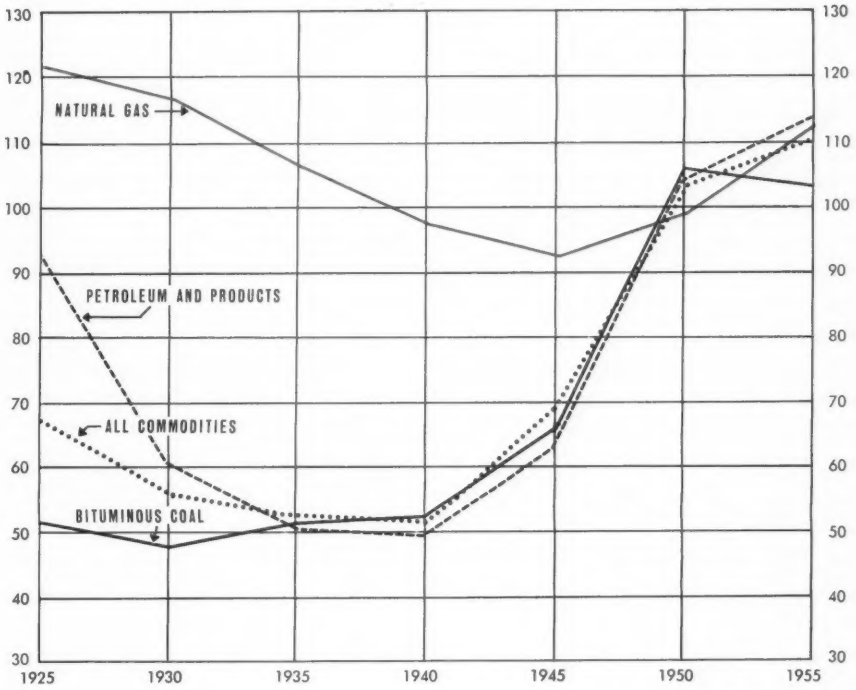
The Supply of Natural Gas

Natural gas cannot be made, but must instead be discovered by exploration and drilling. Gas and oil exist in underground geologic traps, frequently associated together, but there is no way of knowing how many of these deposits exist, where they are located, or how much oil or gas they contain. We only know that petroleum hydrocarbons were deposited in sedimentary beds millions of years ago. These hydrocarbons in underground deposits are merely "neutral stuff," as so aptly stated by Professor Erich Zimmermann, of no value to anyone. It is only by considerable ingenuity, effort, and expense that they can be discovered, developed, and converted into useful resources.

There is no direct method by which underground hydrocarbons can be located. Unfortunately, even the most expensive scientific methods of exploration give only imperfect clues as to the location of geological traps in which oil or gas or both might have accumulated. Only expensive drilling can determine whether commercial quantities of petroleum exist. Of the thousands of wells drilled annually in the search for new fields, only one in nine finds petroleum production. Even after production is found, about one-fourth of the wells drilled in development prove to be dry holes. In 1955, there were 21,500 dry holes and 35,180 producing

WHOLESALE PRICE INDEX FOR MAJOR FUELS

1947-49 = 100



Source: U. S. Bureau of Labor Statistics

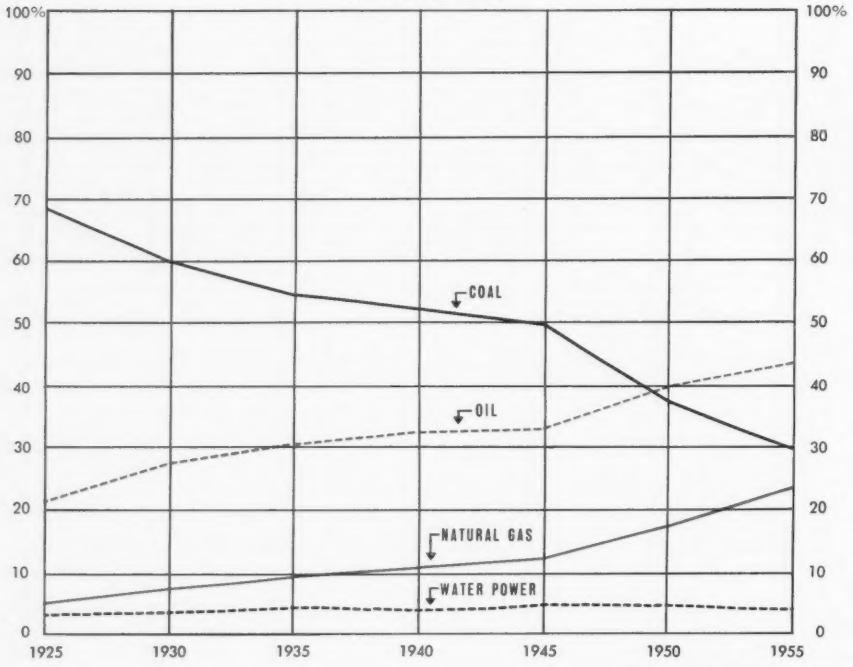
PRICES PAID FOR NATURAL GAS

	Prices at Point of Consumption Reported by Bureau of Mines Cents Per M.c.f.						Prices Reported by Natural Gas Utilities on Sales to Users Cents Per M.c.f.				
	Residential	Commercial	Field Use	Carbon Black	Other Ind.	Total	Residential	Commercial	Ind.	Other	Total
1935	74.6	49.3	4.7	1.6	16.9	22.4	74	49	16	20	33
1940	71.1	47.8	3.8	1.0	16.7	21.7	72	48	16	15	34
1945	68.3	42.4	4.4	2.3	15.8	21.4	64	48	17	17	32
1950	69.0	47.6	6.2	4.8	17.6	26.6	68	51	20	18	37
1954	89.3	64.7	8.3	6.9	23.6	38.1	85	65	25	25	47

Source: U. S. Bureau of Mines; American Gas Association

U. S. CONSUMPTION OF ENERGY

(Per Cent of Total)



Source: U. S. Bureau of Mines

wells drilled, indicating that the industry must expect to drill on the average nearly three dry holes for every five producing wells.

The inescapable difficulties in the search for oil and gas mean that the investment process is quite unlike that of public utilities or manufacturing firms. The usual standards of prudent investment are not applicable in petroleum exploration. What looks like a prudent investment for a well-defined geologic trap may prove to be a complete loss. Large expenditures may produce meager results on some ventures while in other cases excellent discoveries may be made at low cost with a small outlay. Consequently, the variation in costs among ventures is extremely large, far exceeding any range in costs expected in the normal investment process characteristic of manufacturing or utilities, where the cost of creating a certain capacity can be estimated in advance with reasonable accuracy.

The search for oil and gas is generally inseparable, although some areas are predominantly gas producing, such as the San Juan basin of New Mexico. The development of oil and gas resources after they are located depends upon whether they appear commercial. Many gas reserves discovered in the past have not provided any useful production because their development was not commercial on the basis of the gas prices prevailing at the time. After development, oil and gas production are usually carried on together, in many cases from the same field. Therefore, the cost of these fuels is inextricably interwoven.

Exploration and drilling by thousands of operators over many years have discovered and developed petroleum deposits in many areas of the United States. Large discoveries relative to demand were made in the period from about 1926 to about 1940, with the result that the ratio of proved reserves to production increased for both crude oil and natural gas. This development was accompanied by a downward trend in petroleum prices at the well. Since 1940 demand and production have increased faster than proved reserves, causing a downward trend in the ratio of reserves to production, particularly for natural gas, and an upward trend in prices. An active search for new supplies has served to make available large new supplies each year, but the demand has increased much more rapidly than the new supply.

At the beginning of 1955, proved reserves of natural gas in the United States were 212 trillion cubic feet, or about 22.8 times the marketed production and probably about 21 times the total production, including the gas flared from oil wells because economically feasible markets are not available. This compares with a ratio of reserves to production of over 30 during the period 1935-1945. The significance of this development on the price of gas will become apparent upon consideration of how supply and demand operate in the market, and especially of the longterm contracts required by pipelines.

Editor's Note: Part II of this address, "The Market and the Price," will be published in the July-August issue.

ESTIMATED PROVED RESERVES AND PRODUCTION OF CRUDE OIL AND NATURAL GAS IN THE UNITED STATES

	Crude Oil Million Barrels			Natural Gas Trillion Cubic Feet		
	Estimated Proved Reserves January 1	Production	Ratio of Crude Oil Reserves to Production	Estimated Proved Reserves January 1	Marketed Production	Ratio of Gas Reserves to Marketed Production
1925	5,300	764	6.9	23	1.2	19.2
1930	8,100	898	9.0	45	1.9	23.6
1935	12,500	997	12.5	62	1.9	32.5
1940	18,500	1,353	14.0	95	2.7	35.0
1945	19,800	1,714	12.1	134	3.9	34.4
1950	24,600	1,944	13.0	180	6.0	30.0
1955	29,600	2,400	12.5	212	9.3	22.8

Source: Reserve figures based on private estimates before World War II, estimates of PAD for 1945, and estimates of API and AGA since 1945.

Humble introduces Golden Esso Extra

New premium-over-premium gasoline makes June debut in five key cities of Texas

Gilded gasoline pump and arrowed placard call attention to Golden Esso Extra, designed for ultra-high compression engines.

TWO familiar gasoline pumps at Humble service stations were joined in June by a gilded companion designed to dispense Golden Esso Extra, a new, extra-high performance gasoline.

Golden Esso Extra, providing the highest octane rating available in Texas, was developed by Humble research laboratories to satisfy the engine requirements of ultra-high compression motors now in some cars but forecast for many 1957 models.

Humble began marketing Golden Esso Extra in Houston, Baytown, Dallas, Fort Worth, and Austin on June 20. It will be introduced into other areas of the state as servicing facilities are made available.

"The need for this new gasoline became urgent earlier than was anticipated," said H. W. Ferguson, Humble vice-president in charge of Refining and Marketing. "Our No. 1 gasoline, Humble Esso Extra, gives top performance in the vast majority of the high-compression engines now on the road; however, there are already some automobiles that require a super-premium fuel. Golden Esso Extra is the answer to that need."

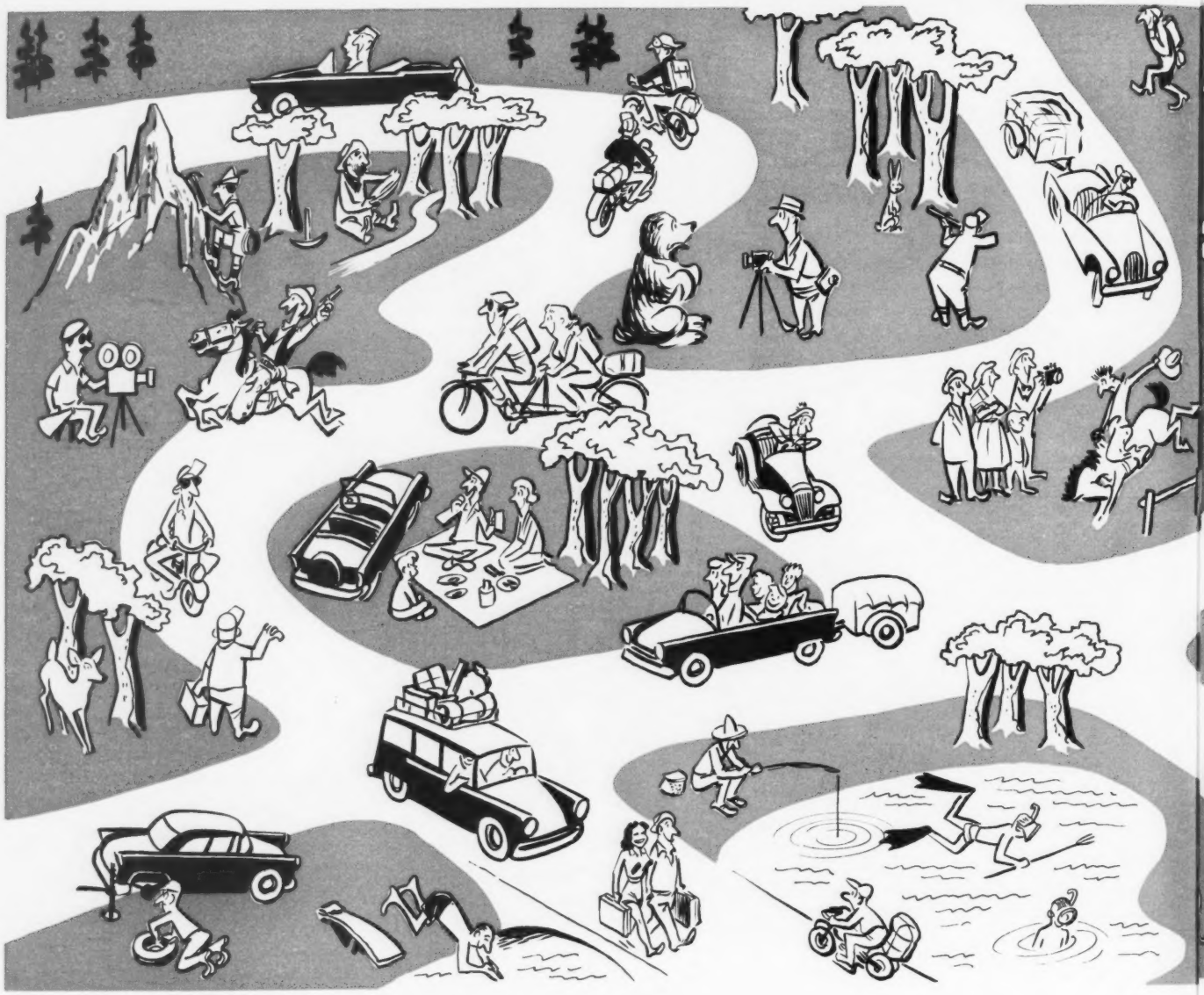
Since every step upward in the performance rating of a gasoline is a costly one, Golden Esso Extra will carry a three-cent higher tank wagon price than Humble Esso Extra, which is premium priced over Humble Motor Fuel. Thus, the consumer will now have the economic advantage of being able to choose the fuel that will operate his car at maximum efficiency.

Mr. Ferguson pointed out that the new "premium *over* premium" fuel enables the motorist to select the fuel that meets the power requirements of his car at the lowest cost. Golden Esso Extra is not intended to replace Humble Esso Extra; rather, it is blended for those cars which no gasoline now on the market can satisfy.

Meanwhile, the quality of Esso Extra Gasoline will continue to be improved as required to meet the needs of the overall car population and provide for quality required for most cars on the road. Humble Motor Fuel will be maintained and improved for the thousands who want a fine "regular" gasoline at a regular price.

All cars *can* use Golden Esso Extra, of course. But it is really most important for cars with the new high compression engines. In these, it will give the full performance built into the engine at the factory. And the increased mileage, better performance and operating economy of Golden Esso Extra more than offset the small difference in price.

So, to two great gasolines, Humble adds another—Golden Esso Extra, a new fuel to provide for the ever-widening range in power requirements.



Their Vocation . . . Your

AS THE TELEPHONE rang, the girl tracing a green line across the face of a travel map turned from her work. Lifting the receiver and pushing aside an assortment of vacation brochures to get at her notepad, she heard an unprefaced question: "Where's the nearest snow?"

Within five minutes, she was on the phone again and the target of a very different kind of query: "Is the desert still hot? Or have they fixed that?"

At Humble Touring Service, questions like these are everyday fare. And the entire staff knows that the morning mail and the opened office door are as likely to bring odd and amusing requests as the telephone. Nearly all get answered.

It was December and the nearest snow, the girl said, was two and one-half inches deep in Dalhart, the northwestern gate to the Texas Panhandle (the party on the phone was a native of Minnesota and wanted his Texas-born son to see "some real snow").

To the second question, she answered that in general, the desert is hot year-round in the daytime, cold at night. For the Mojave Desert in particular, she quoted sample temperature ranges at Yuma, Barstow and Palm Springs,

r Vacation

Humble Touring Service has answered a million travel requests, and some bizarre questions

and suggested types of clothing (the party was planning a Christmas trip to California).

The versatility of the Touring Service extends past weather reporting, however. They've found a Mexican pen pal for an English boy, advised cautious hitchhikers about heaviest traveled highways, settled a bet for a man who asked "How long is Long Island?" (118 miles) and told a woman the population of Wichita Falls, Texas, was 68,042, only to have her respond: "How many people is 68,042?" What's more, they've found time to perform their more normal duties.

Since vacation season is here again, the volume of these normal duties—providing travel material and information—is on the increase. This month, for instance, the telephone will ring, on the average, every four minutes. Several hundred requests — many of them on special cards distributed by Humble Dealers and Agents—will arrive daily by mail. An equal number will come over-the-counter at the Main Street office in Houston every day.

Most calls will come from the body of 75 million Americans who will be taking their vacation by automobile this year; others will be postmarked Holland, Spain, Japan, Peru, Canada and other countries. Some tourists will know exactly where they want to go, how long they want to stay, the things they want to do and see. A few will ask for suggestions from start to finish.

After 23 years in operation, Humble Touring Service has pretty well isolated its patrons to one of two general species: (1) The young and eager who try to cram a complete U. S. tour into a two-week vacation. (2) The stay-at-homers who will vacation in Texas, seek maximum relaxation, minimum tourage. This includes the tired businessman and his wife who have a

month if he wants it (he usually doesn't).

Those with seven-league boots might relish a three-month, 8000-mile auto trek to Buenos Aires, Argentina, along the almost-completed Pan-American Highway. This involves riding piggy-

back by rail, river barge and ocean liner part of the way, but the Touring Service can tell you how to make it. Or they can route you north to Alaska over a somewhat less adventuresome, though completed, part of the Highway.

The weary business executive, on the other hand, might find himself fishing in the Rio Grande of Texas' own Big Bend National Park or basking on a Gulf Coast beach. The Lone Star State is a particularly delightful vacation spot this time of year since wood and water sports are at their best. Outdoor Texas has indeed come into its own as one of the nation's top *all-season* recreational areas and more and more natives are staying home to enjoy it.

Almost any vacation, in or out of Texas, can be made more enjoyable by the prompt, free and thorough travel guidance offered by Humble Touring Service. Marked maps, taking into account latest weather and road conditions, are the bread and butter of the Trip Kit. The Kit itself is an attractive, easy-to-read packet that fits handily into any glove compartment. Printed on its multi-folds are addresses of the various states' information offices, all radio stations of 10,000 watts and over, a "before you leave home" checklist (Sample: "Stop milk, newspaper and other deliveries"), and a similar check chart for your automobile.

Included, as an extra service, is a trip log and (if requested), pamphlets on the best places to sleep, camp, fish, hunt, swim, or perhaps—ski. Also: travel safety suggestions, hints on packing, tips on speed limits and gasoline taxes, charts of mileage, ferry schedules, tolls, customs and immigration regulations.

Often Humble Touring Service patrons—many of whom return time and again—suggest ideas which are incorporated into the Kit. One such suggestion now in use is a list of all Humble service stations open twenty-four hours a day.

A deluge of these ideas, along with compliments (and yes, even some criticism) came in recently when a survey was conducted among Touring Service users. Of the more than 1,000 questionnaires circulated, an unusually high 50 per cent were returned. The results were enlightening, even pride provoking. Eighty-seven per cent said the service was "helpful"; only 2 per cent said it was of "little or no help."

In making the survey, Humble wasn't fishing for praise; it sincerely wanted to find out ways to serve the public better. This constant striving to provide increased service, coupled with the migration of the American tourist southward in recent years, led to branch offices of the Touring Service at Laredo in 1946 and Brownsville in 1948. There's even a special south-of-the-border packet including an informative booklet entitled "Touristips for Mexico."

One middle-aged couple abandoned plans for Mexico City, for instance, on reading the booklet and learning all pets must be vaccinated before entry into Mexico. "They'll not stick a needle in my dog," said the lady indignantly; "the trip's off." Such trivial inconveniences are not discouraging thousands of other tourists, though, as numerous requests for Mexico material indicate.

Other services of the Touring Service staff are varied. They sell auto license tags, hunting and fishing licenses, duck stamps and sometimes, tickets to

Houston civic events. If the April 15th income tax deadline should loom up dead ahead, they'll even provide you a 1040 form.

Humble Touring Service came into being in April, 1933, as an arm of the Sales Department. Walter E. Hill, now supervisor of a 14-employee staff, *then* was a one-man team. The first request was from a Dr. Jackson who wanted to motor from Bryan, Texas, to Brooklyn.

Counting the Bryan physician, 6,319 persons became acquainted with the agency in that first year of operation. To measure growth, compare that figure with the *130,289* persons helped in 1955—an increase of 2000 per cent. Covering the 23-year span, more than *one million* travel assists have been made.

Currently, the different kinds of vacation and travel brochures stocked and circulated number in the thousands. More than a million Texas maps are distributed annually. Maps are

sometimes furnished in quantities to larger special groups, but Humble Touring Service has rarely had such an offbeat request as that of the customer who came in to say she'd like 50 maps of Texas.

"School teacher?" inquired her helper.

"No," said the woman, "Housewife and mother. I want to wallpaper my son's room with them."

Service stations themselves, of course, were the original travel bureaus. Even today, the befuddled American tourist knows that reliable information is no farther away than the nearest service station. The Humble Dealer or Agent especially makes it his business to know more than a little about highways and vacation spots in his area.

He's not equipped, though, to answer the kind of question phoned into the Touring Service recently. It was from a high school student who wanted to settle an argument of interstellar proportions. "How far is Mars?" he asked.

It took a bit of doing, but after a few minutes the telephone helper returned to say that in 1956, the planet Mars was the nearest since 1924—only 35 million miles away. She was sorry, she said with a suppressed smile, but the Humble Touring Service wouldn't be able to provide a routed map for this particular trip.

"Not just yet."

Dogwood Trail — *Bob Wygant*

TEXAS . . . SHOWCASE FOR WILDFLOWERS

TEXAS highways, especially in the spring and early summer, are opulent showcases of native wildflowers. Over the far-flung vastness of the Lone Star domain, more than four thousand species are within viewing and scenting distance of vacation thoroughfares.

Wildflower-wise travelers know they cannot expect to see more than a few of these on the average vacation; in fact, *not one* wildflower is common to all Texas. Even the bluebonnet, the white-flecked state flower, is found mostly in the Central, North Central and Southwest sectors.

Tourists of western aridlands will find cacti, yucca, century plant and Spanish dagger. Blooming in the bayous and eastern lowlands are floating hyacinth, water lily and magnolia. Scattered in between: redbud, sunflower, bluebells, wild verbena, buttercup, evening primrose, fire wheel, black-eyed Susan, Indian paintbrush, and Indian blanket.

Here, Artist Bob Wygant captures in bloom two widely-separated notables of Texas flora: above, the flowering dogwood of East Texas; on the centerspread, that indispensible ingredient of classic western literature—purple sage.

Land of the Purple Sage

Bob Wygant

TEXAS NOMAD WARRIORS

SINCE the days of ancient Rome, one nation or another has dawdled with the dangerous concept of the superman and the master race.

This delusion, based on a "born to rule" philosophy and sustained on military might, has not confined itself to the Old World or to the so-called civilized peoples. More than two centuries ago, a tribe of self-styled Indian "supermen" migrated to Texas. Driving other tribes before them (including the fierce Apaches, whom they defeated in a legendary 7-days battle), they took and held the best hunting grounds on the great plains, an area well suited to their nomadic way of life. Once established there, they looked with bold,

Return from the Hunt *Randy Steffen*

The Comanches, who came to Texas more than 200 years ago, formed a rocklike barrier against frontier expansion

lip-curling disdain upon anyone—red or white—who dared to challenge their position.

As token of their superiority, these Indians called themselves the *Nimma,* or "The People." They were the chosen ones, the children of the sun. Spaniards and Mexicans, and later the Texas settlers, knew them as Comanches. The origin of "Comanche" is in doubt, but one authority suggests it may stem from the Ute term *Komantcia* meaning "anyone who wants to fight me all the time."

If this be true, the Comanche was well named. Fight the Comanche did, to get what he wanted, or to keep what he had. Spanish troops of the 18th century proved no match for him. Mexican settlements below the Rio Grande lived in mortal fear of his terrible raids. Most significant of all, the fighting Comanche formed a stern and rocklike barrier to frontier expansion in Texas, besting even the famous Texas Rangers on most occasions. Later, the hard-riding U. S. Cavalry could not dislodge him from his chosen land until his food supply–the buffalo herds–had been destroyed.

For courage, for endurance, for horsemanship, and for all those qualities that make a good cavalryman, the Comanches had no equal among savages of the West. And it is certain that they hung on far beyond the point of logic and reason. But the scales of battle were balanced too heavily against them. Finally, in 1875—with their tribal lodges ravaged by hunger and disease; with their buffalo slaughtered by white hunters; and with hundreds of their young braves dead on prairie battlefields—the remnants of a once-powerful tribe reluctantly agreed to a lasting peace. Few people in history had so fiercely resisted an invasion of their country.

Just who were these proud savages, and what brought them to Texas? What were they like? How did they live? These questions have intrigued scholar and small boy alike, from ethnologist and anthropologist to the youngest devotee of cowboys-and-Indians movies.

Originally, we are told, the Comanches belonged to the Shoshone family and lived along the upper Platte River in Wyoming country. They began to leave that area and move south at the beginning of the 18th century. According to one tribal legend, they split away from the Shoshones after an argument developed over how a slain bear should be distributed between the two groups. That legend, at any rate, may have led to the sign-language name for Comanches, which acts out "the snake that goes backward." A more likely reason for the southward migration, says one authority, is that the Comanches may have visited the South Plains, found it to their liking, and decided to stay there.

THE tribe itself was not a great single unit, but consisted of at least half a dozen or more separate bands or divisions. The northernmost of these, living in what is now southern Kansas, were the *Yamparikas,* or "root-eaters." Just south of this band lived the *Kotsotekas,* or "buffalo-eaters." The *Nokoni,* or "wanderers," ranged along the Red River. The *Quahadi,* or "antelope people," made the Llano Estacado of northwest Texas their hunting grounds. Ranging farthest southward, almost to Austin, Fredericksburg, and San Antonio were the *Penatekas,* or "honey-eaters." This last band was the one most closely associated with Texas and the one which most directly influenced Texas history.

No discussion of the Comanches, however brief, would be complete without some mention of their horsemanship. No sooner had they moved into the South Plains than they began to acquire horses; at first, most likely, from the Spaniards. Later, most of their massive raids against the Mexican and frontier settlements were made to steal horses and plunder, rather than to shed blood or take captives. Reports of the time say that no warrior considered himself worthy of the name unless he owned from 50 to 200 mounts—in the case of great chiefs, more than that!

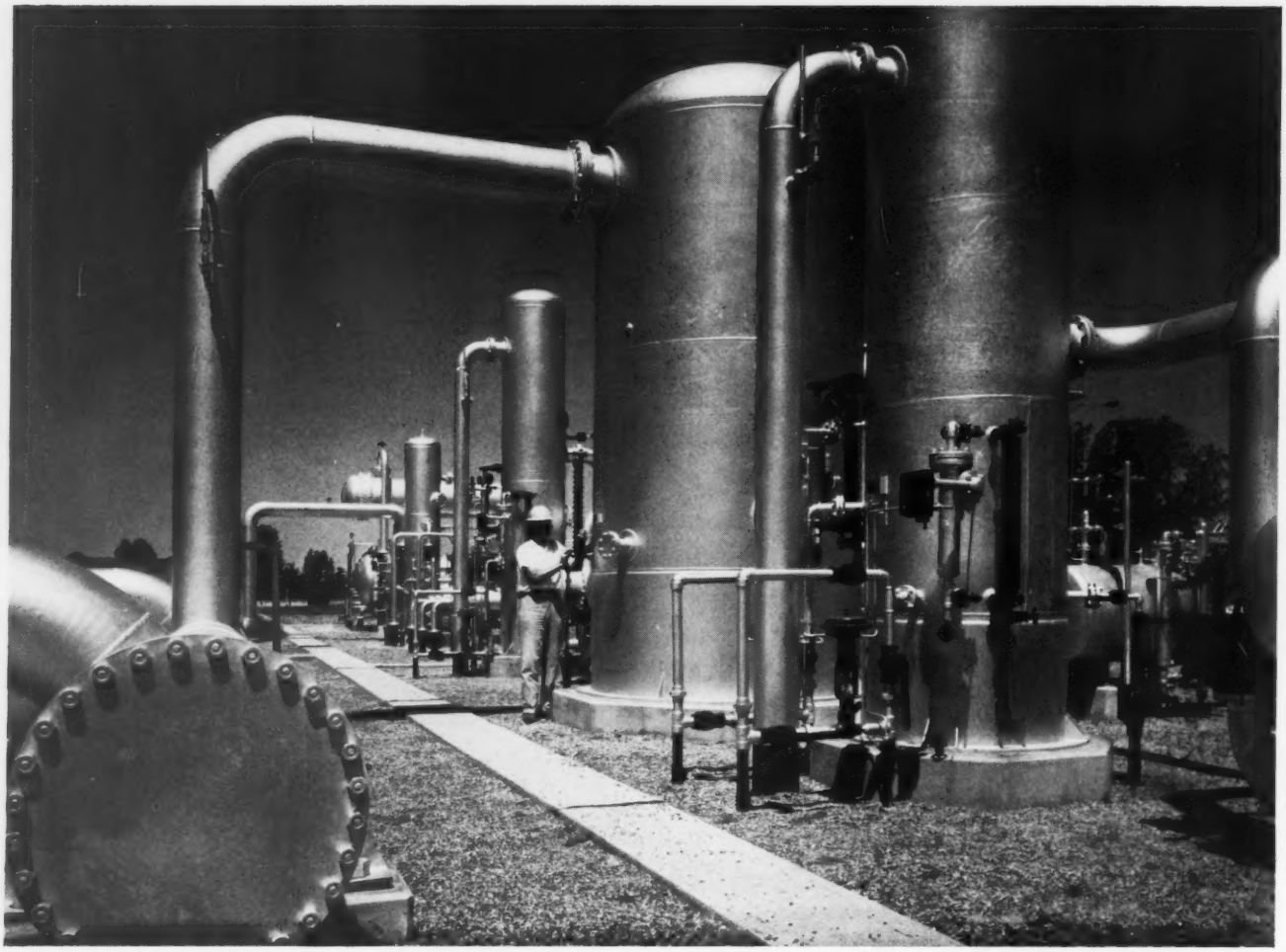
A COMANCHE, almost literally, lived on horseback. In time of peace, horses made it easier to move from one nomad campsite to the next. During wars and raids, horses converted Comanches into swift-moving demons. Indeed, to "ride like a Comanche" became a frontier simile. It was said that they sat their mounts "like Centaurs," man and beast almost blending into a single animal during lightning attacks. Under fire, the warrior leaned forward, presenting a small target, while he sped arrows with amazing speed and accuracy *under his horse's neck!*

The Comanche was made up of some puzzling mixtures. He believed in the Great Spirit, which lived in or beyond the sun. He believed, too, in his own immortality. His credo was "a brave man dies young," but he had a morbid fear of death by strangulation. At death, he thought, his soul escaped through his mouth. To cut off his last breath would be to confine his soul within his corpse forever.

Though to die in battle was a warrior's highest honor, he would not willingly attack at night. To die in darkness meant that his soul would be doomed to wander forever in a land of eternal night. And he had certain taboos, like all savages. He would not eat birds or fish. He never killed a wolf, for wolves were his brothers. Though he would risk his life to remove a dead comrade from the battlefield, he would not touch the body if it were scalped.

Such, in part and in brief, was the Comanche. He scorned to till the soil or to remain long in one place. He was a restless wanderer. His home was the boundless prairie; his food and raiment, the buffalo provided by the Great Spirit. In fact, it was his utter dependence on the buffalo that made the Comanche a nomad and made it possible for the white man to defeat him by destroying the buffalo herds. He never asked for mercy and rarely gave it. By civilized standards, he could be incredibly cruel, yet he was generous with his friends and loving toward his children.

Fierce and unyielding, refusing to accept the white man or adopt his ways as other Indians did, the Comanches delayed Texas progress for nearly half a century after the Battle of San Jacinto.



In shiny tanks and towers of new plant, casinghead gas flowing from Neches Field is processed—the liquid hydrocarbons removed, residue gas dehydrated and sold. Gas begins journey through plant in these scrubbers which remove oil and water.

THE NECHES GAS

New processing plant in East Texas is added in Humble's expanding conservation program

SOON after the Neches Oil Field was discovered three years ago in the rolling hills of East Texas, Humble engineers went to work figuring ways and means for best conserving the casinghead gas which surged from the wells along with the oil.

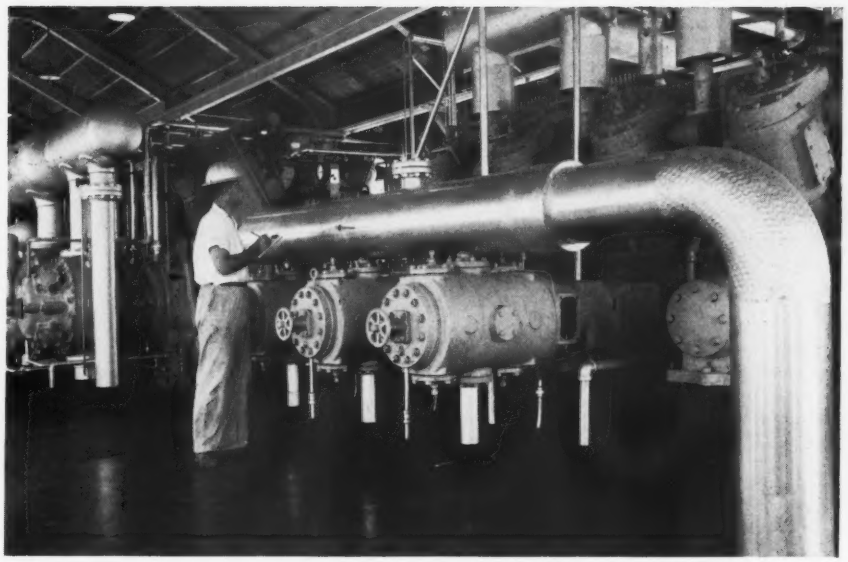
Was the gas rich enough in liquid hydrocarbons to warrant their recovery? If so, should the gas be pipelined to a processing plant already operating, or should a new one be built in the field? Should residue of the gas after processing be injected back into the reservoir to assist in lifting oil to the surface or should it be sold?

This January, not two miles from the Neches Field discovery site, these and other questions were resolved in the throbbing compression chambers, cooling units and absorption towers at Humble's brand new Neches Gas Plant.

In its shiny maze of pipes, towers, tubes and tanks, gas flowing from producing oil wells in the Neches Field is effectively conserved—the hydrocarbon liquids removed and the residue gas compressed, dehydrated and sold.

Flowing into one end of the plant during an average day's operation are approximately 7,000,000 cubic feet of rich, wet casinghead gas. Flowing out the other end in this same period of time are 4,000,000 cubic feet of dry residue gas for sale plus 40,000 gallons of natural gasoline, propane, butane and ethane-methane.

Actually, the decision to build such an installation came easy after all the



Big compressors in background boost casinghead gas to processing and sales pressures—up to 500 pounds per square inch. Foreground unit is propane refrigerant compressor.

facts were in. The casinghead gas flowing from the field was found to be extremely wet and rich with vaporized liquids. Also, the volume of gas in the reservoir was estimated to be sufficiently large to enable operation of the plant for many years. These factors, plus the fact that the nearest other gas plant was 40 miles away, made a processing installation in the center of the field highly practical.

The plant was designed to remove 95 per cent of the propane and 100 per cent of the gasoline and butane at an average daily gas intake of 7,000,000 cubic feet. However, if necessary, the plant is capable of processing 11,000,000 cubic feet of casinghead gas a day with a reduced propane recovery rate of 85 per cent.

It is basically a simple process—the way the Neches Plant extracts the raw liquids from the gas. After entering the plant from field gathering lines, the gas is progressively compressed and scrubbed. Then it enters a refrigeration unit where some of the gasoline, butane and propane liquefy and drain off. The chilled gas remaining travels to an absorption tower where it is bubbled up through a light oil—similar to kerosene—that absorbs the remainder of the liquids. The oil then is separated from the raw liquid products in a still and used again to absorb more liquids.

Some of the residue gas remaining is used in the plant's fuel system or is pipelined back to the field where it powers oil pumping and production machinery. Most of the gas, however, is compressed again and sold to a gas transmission company.

As far as the Neches Gas Plant is concerned, the operation is complete at this point. It has done its job of extracting the liquids from the wet casinghead gas and preparing the residue for sale. But the operation is *not* complete with the raw liquids. They have been separated from the gas, but not from each other.

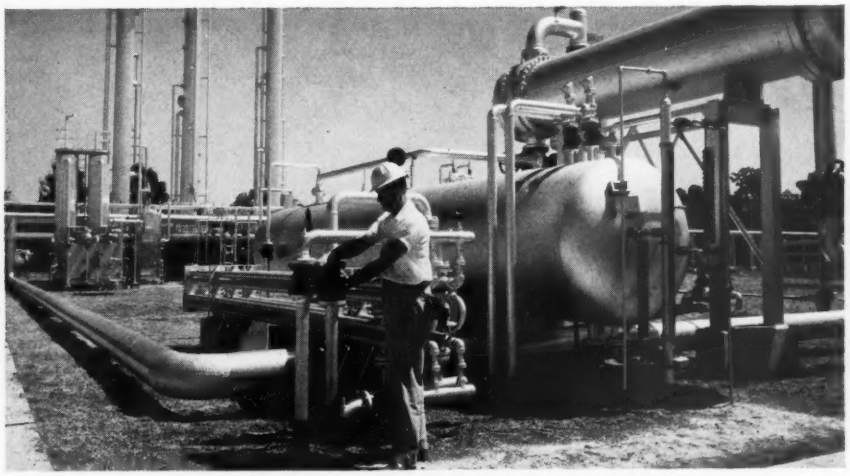
For final fractionation, they are pipelined 40 miles away to Humble's American Gas Plant between Kilgore and Henderson, Texas, where the ethane-methane is removed. The deethanized raw product then is pipelined some four miles back to the Company's London Gas Plant for further fractionation.

These two natural gasoline plants, which also process casinghead gas from oil wells in their own backyards, take the raw liquid from Neches along with their own production, and separate it into the various marketable products —natural gasoline, iso-butane, normal butane and propane.

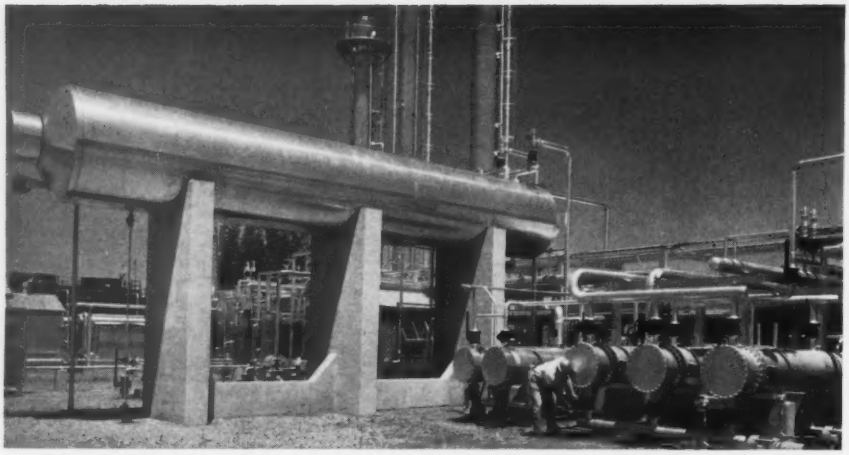
Normally all the natural gasoline and butane are pipelined from the London Plant approximately 300 miles to Humble's Baytown Refinery. The propane is pumped by pipeline to a local customer or shipped by tank cars to more distant markets.

Natural gasoline plants like the one at Neches are not uncommon on the petroleum scene today, but the way Neches ties in with the American and London plants is unique. No other Humble plant duplicates this technique

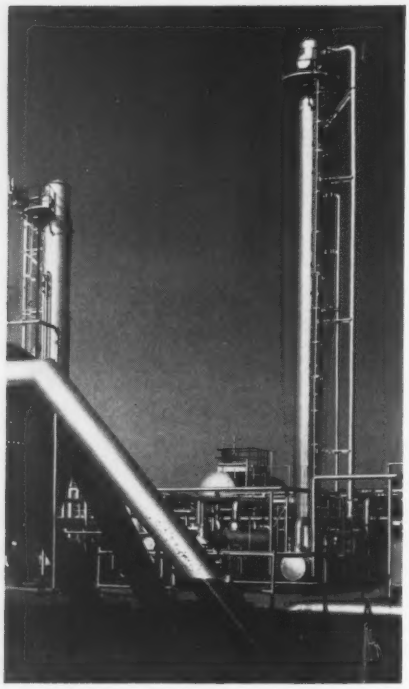
PLANT



Refrigeration equipment in foreground is key part of cycle that cools compressed gas and assists in almost complete recovery of liquid hydrocarbons in absorption towers.



From product tank in foreground raw liquid recovered in absorption and distillation towers is pipelined 40 miles to Humble's American, London Plants for fractionation.



Fractionation of Neches product begins in American Plant's de-ethanizer tower.

—pipelining a raw "uncut" product from one natural gasoline plant to other similar plants for fractionation.

The decision to relate Neches with the two older and interrelated plants was made for operating efficiency and other economic reasons. The operation was designed to utilize existing equipment, markets, storage facilities and pipeline outlets already in place at the American and London Plants, rather than to provide new ones at Neches.

Although the Neches Plant is one of the Company's smallest gas plants, considering the volume of gas processed daily, it does represent another significant step in Humble's expanding conservation program.

Humble now operates a total of 13 plants in Texas and Louisiana designed to extract liquid hydrocarbons from natural gas. Like Neches, all were put into operation in or near significant oil or gas fields in which the Company has an interest.

Expansion of these conservation facilities has been particularly great since the end of World War II. Since then, the Company has built seven new gas processing plants at a total cost of over $29,000,000 and has cooperated in joint operation of eight others.

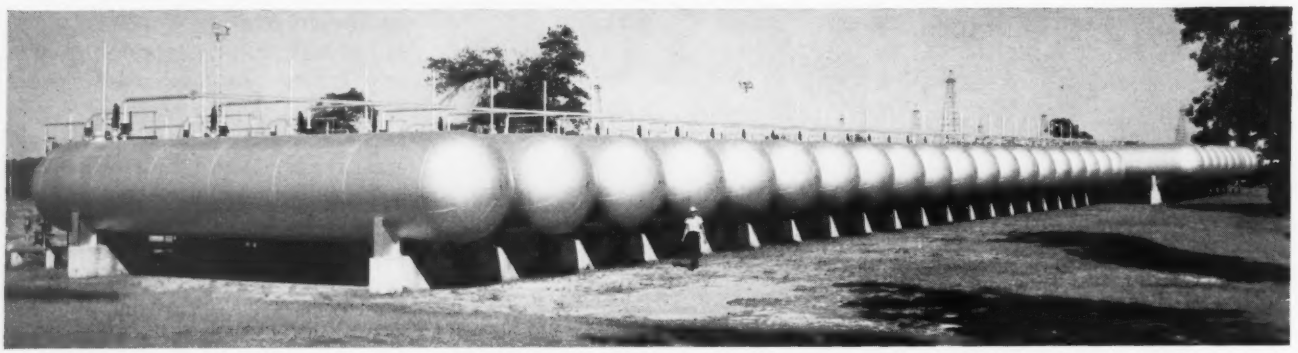
Even the older plants like American and London which have been operating for many years have been modernized and rehabilitated to make their conservation work more efficient. Extensive expansion programs have been completed at other plants such as Conroe and the Katy Gas Cycling Plant. New equipment is constantly being utilized and better recovery techniques are being developed.

What are the results of this expansion? Humble's total production of natural gasoline and other liquid hydrocarbons has been upped from 567,000 gallons per day in 1945 to the 1955 daily volume level of 1,370,000 gallons.

The liquid products recovered at the Neches Plant and the Company's other natural gasoline installations serve many vital and useful purposes.

The natural gasoline, for example, is blended with other petroleum products to make high-octane gasoline. Butane has many uses, such as in the manufacture of synthetic rubber and for LPG—liquefied petroleum gas, widely utilized for heating, cooking, and running irrigation pumps and engines of various types. Propane has many uses in common with butane such as in LPG and in the manufacture of various chemical products.

Everywhere on the petroleum scene today, gas plants like the new one at Neches are not only helping conserve one of our greatest natural resources, but also are making for better and more gracious living.



Storage tanks at London Plant temporarily house fractionated products. Normally all the natural gasoline and butane are pipelined approximately 300 miles to the Baytown Refinery. Most of the propane is pumped by pipeline to a local market.

Run Tickets on Tape

Oil gauger stamps vital information on a run ticket in the presence of pumper.

Thanks to new Humble Pipe Line Company procedure, oil payments are speeded, gaugers are freed of clerical chores

THE oil gauger of yesteryear was, of special necessity, a sturdy breed. He walked or rode a horse or mule hundreds of miles during his seven-day week and did it in spite of all hazards. Like the mailman, he had to get through, and if that meant swimming a swollen stream or gauging and testing oil far into the night, that's exactly what he did. That packsack of equipment could get plenty heavy—especially the centrifuge machine which was powered by the muscle in his arm.

The life of the Humble Pipe Line Company gauger today is, physically, an easier one. With the advent of the automobile and the centrifuge operated off the car battery, he is able to trigger the transport of more oil in less time—and do it more comfortably.

But strangely enough, one of the gauger's activities—bookkeeping—has grown increasingly cumbersome in recent years. Originally after filling out run tickets, the gauger merely sent them to the Houston Office, where the gross volumes were calculated and verified manually. About four years ago, this method was changed, so that the gauger did all run ticket calculations in the field, and sent his reports to Houston to be verified by IBM equipment. The method was accurate, because machine verification detected any errors by the gauger, but the correction of them was a time-consuming procedure.

The Humble Pipe Line gauger was spending more and more of his time—perhaps a fourth of his workday—slaving over an adding machine. But now, thanks to still another new run ticket process in use by Humble Pipe Line, the gauger will be relieved of most of his clerical chores. And since the average gauger is not a trained accountant and would rather move oil than keep books, he's naturally pretty happy with the plan.

In July, 1955, the Methods and Procedures staff in the Internal Audit Division of the Accounting Department (Humble Oil & Refining Company) along with Humble Pipe Line personnel started a study with four chief aims: (1) To cut down on run ticket field clerical errors. (2) To relieve gaugers of their increasing clerical duties. (3) To speed the information from run tickets to all departments

With help of tank tables, trained clerks in Division office calculate and verify barrels-of-oil-run from run ticket figures.

Manually-operated "Add-Punch" machine transfers to perforated tape all data on run ticket pertinent to oil payments.

concerned and (4) To speed the processing of oil payment checks.

The elimination of clerical miscues certainly was no new problem. An 1887 gauger's manual issued in Harmony, Pennsylvania, quotes an 1882 rule: "If the number of your errors in one month does not exceed four (4) per cent of the number of runs in that month, your wages for that month will be ninety ($90) dollars; if the number exceeds four (4) per cent, your wages for that month will be seventy-five ($75) dollars; if it exceeds ten (10) per cent, you will be liable to dismissal."

Errors were never this serious a problem with 37-year-old Humble Pipe Line. Such errors as did creep in were readily detected and corrected after the run tickets reached the Houston Office. However, they were of enough consequence that the Methods and Procedures staff put the old system of run ticket recording and accounting under close scrutiny. Here, basically, is how they found the five Divisions of Humble Pipe Line to be operating:

The gauger, after returning from his leases where he had gauged, tested and run oil would fill out his run tickets (small multi-copy forms containing basic information from which payment for oil is made). From these he would calculate the gross barrels run from tank tables furnished by the Houston Office, and post this information in proration records. He then entered on a seal record the numbers of the seals he had placed on tank valves and finally mailed his run tickets to Houston.

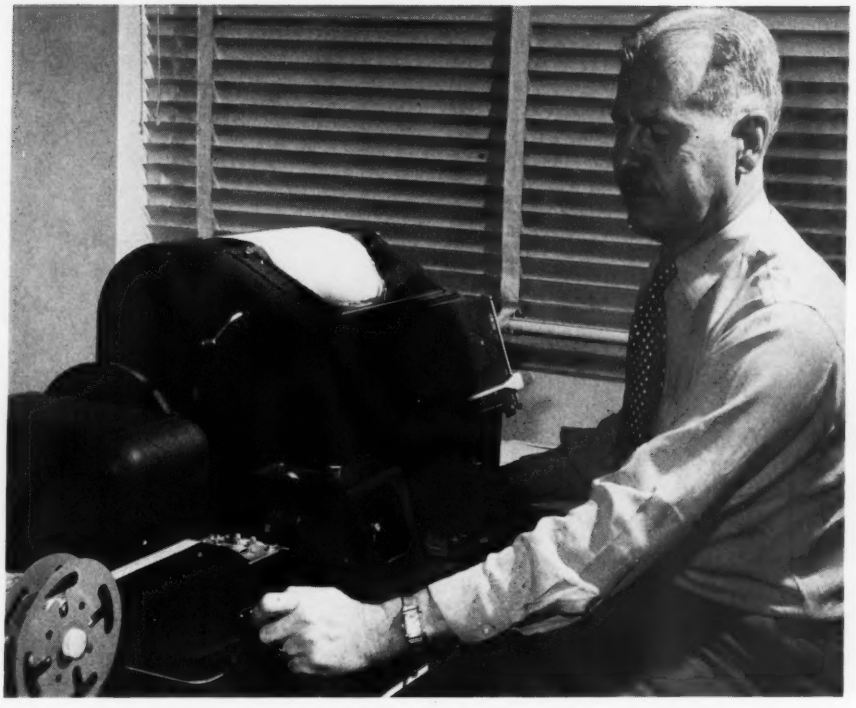
Under the new system, the proration records, the tank tables and the seal records have been moved to the Division office. The only clerical work the gauger does is to fill out his run ticket and mail it to the Division office, where trained personnel do the rest with a high degree of speed and accuracy.

Here, then, the study accomplished Aim No. 1 (reduce field clerical errors) and No. 2 (lighten gauger's bookkeeping load). Aims No. 3 (speedier transmission of information) and No. 4 (faster oil payment check processing) were handled with similar dispatch.

The information on the run tickets, when received at the Division office, is processed on an "Add-Punch" machine with a tape-cutting attachment. After various checkouts to verify accuracy of the run ticket, the tape is fed into a teletype sender and transmitted to Houston.

Another teletype machine duplicates the tape in Houston, where it is fed into a tape to card-punch machine to process the cards for further use. These cards are then placed in business machines which verify all the calculations and post the information to the various accounts. Finally, checks are written for oil payment—all without further calculations by clerical personnel.

Run tickets on tape are punched out in Houston on teletype receiving apparatus.



Now on punched tape, run ticket batches are threaded through teletype unit which transmits them to Houston main office. Sending time of one run ticket: 11 seconds.

This plan was set up on an experimental basis in the Refugio District of the Southwest Texas Division (Corpus Christi) in September after the Methods and Procedures study in July. West Texas Division began on the same trial basis October 1; East Texas, February 1, 1956; North Texas, March 1; and the Southern Division followed April 1.

Headaches have been many, of course, but what of the results? Among the 40 oil gaugers in the Southwest Texas Division (where the system is in full operation), complaints about heavy bookkeeping duties have been reduced to zero. When maximum efficiency is reached, it is estimated the time to process oil payment checks will be cut a full two days. And as for accuracy, here's a convincing "before" and "after" story: In January, 1955, a total of 160 calculation errors were corrected in the Houston Office for the Southwest Texas Division. In March, 1956, with the new system operating full steam, there were *no errors!*

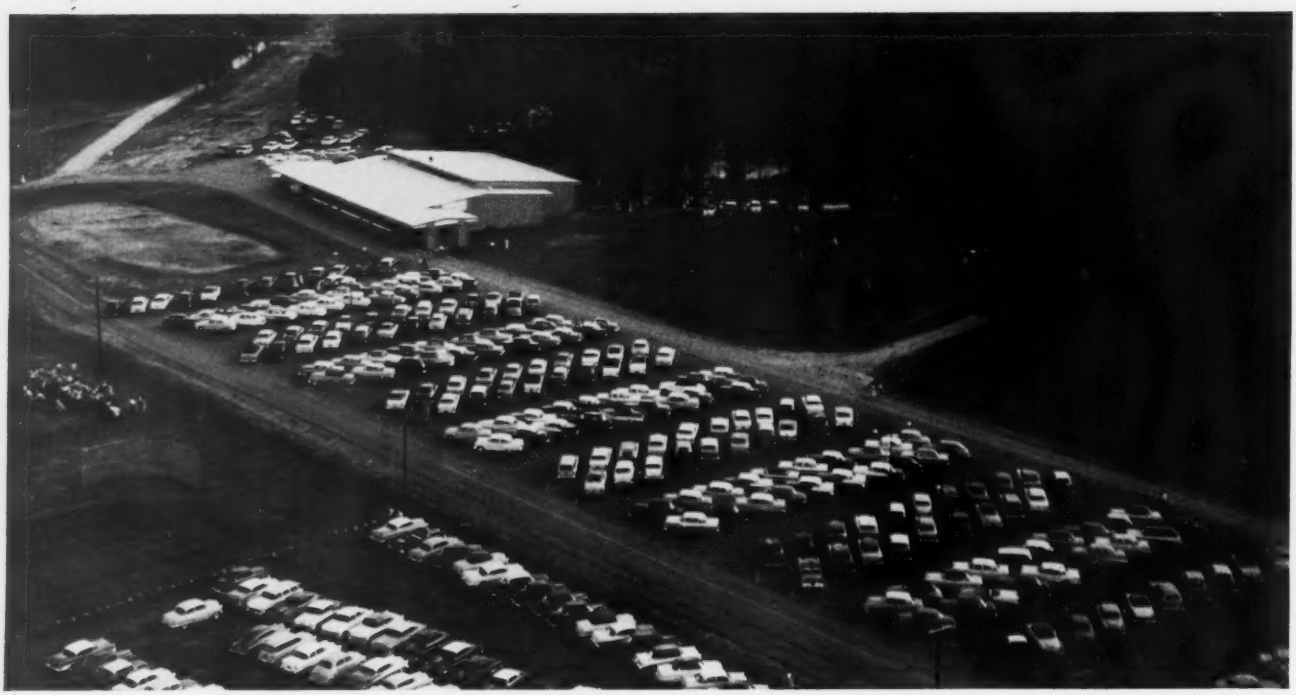
The success of the new run ticket process has been such that it has attracted widespread interest outside Humble Pipe Line Company. Several other oil and pipe line companies are studying the procedure for their own use.

Where now? The process, now functioning throughout the Southwest Texas, West Texas, East Texas and Southern Divisions and partially in the North Texas Division, presently is operating at about 90 percent capacity. It is estimated that during June, for instance, about 38,700 of the 43,000 run tickets were processed by the new method. By July 1, the system is scheduled for complete operation in all five Divisions.

When this happens, all 269 gaugers for Humble Pipe Line can abandon their adding machines with the knowing satisfaction that newly-developed business machines and trained personnel have lifted a bookkeeping burden from their shoulders.

Automatic tape-to-card converter takes information from tape, transfers it to IBM cards. Chance for human error is remote.

Finally, IBM cards are fed into machine which prints oil payment checks. System should cut payment time by two days.



Aerial view shows parking area, softball diamond and putting green near front of clubhouse. To the rear of clubhouse, in wooded area, are the swimming pool, tennis courts and picnic grounds. Back nine of golf course winds down fairway at left.

HUMBLE RECREATION CLUB OPENS

New playground for employees in Houston-Baytown area offers varied facilities for leisure-time enjoyment

Clubhouse lobby is finished in brick and green paneling, furnished with easy chairs overlooking picture windows and golf course. Entrance at left leads to ballroom.

FOR more than a quarter of a century, Humble employees in the Houston-Baytown area dreamed of a private recreation club, a leisure-time playground for themselves and their families.

In April of this year, on a beautifully-wooded site southeast of Houston, that dream came true. The long-awaited Humble Recreation Club was opened.

Here on 187 acres of a former early-Texas cattle ranch are some of the finest recreation facilities available anywhere. The modern, air-conditioned clubhouse is complete with comfortable lounge chairs overlooking floor-to-ceiling picture windows, a snack bar, private game rooms, and a spacious ballroom which can be enlarged or reduced, according to space requirements.

Outside, the more athletically inclined can take their choice of a swimming pool, tennis courts, softball diamond, picnic grounds, putting green or a winding 18-hole golf course. There's a wading pool, too, to delight the hearts and cool the feet of smaller fry.

As with all worthy projects, the new Club was not easily brought into being. On several occasions in the past, proposals had been made for such a recre-

Swimming pool—fan shaped and Olympic-sized—is continually fed by fresh, filtered and chlorinated well water. It also is laned for swimming contests and illuminated with built-in under-water lights. Pool depth ranges from 3 to 12 feet.

ation center to be situated logically in the highly-industrialized Houston-Baytown area—where almost 60 per cent of Humble's approximately 19,000 employees are located and where recreation facilities are generally limited. But for one reason or another, each proposal had been discarded. Finally, in 1953, another proposal was made. Both the Company and the employees considered this project worthwhile.

The Company made available a club site on land it had owned for many years and helped in improving the picnic grounds facilities. The employees, through the newly-formed Humble Recreation Club, assumed responsibility for construction of the clubhouse, golf course, tennis courts, swimming pool and other recreation facilities and agreed to operate on a self-sustaining basis.

The new Club functions as a private corporation. Its stockholders are employee-members. Its board of directors is elected by these members. It sets its own course and is totally independent of the Humble Companies.

Those who have already sampled the pleasures of a club so splendidly equipped and so dedicated to their leisure enjoyment in the years ahead agree on one point: It was worth waiting for!

Tennis courts have asphalt-cork surface, are tinted green and completely lighted.

Golf course features narrow, wooded fairways plus water and sand hazards.

Shaded picnic grounds are equipped with 30 barbecue pits, plus family-size redwood tables and benches. To accommodate bigger parties, an extra-large pit is available.

Buckley Named Assistant Manager of Exploration

Stuart E. Buckley

Stuart E. Buckley, formerly head of the Production Research Division, who has been serving as acting assistant chief geologist under the Executive Development Program, was appointed assistant manager of the Exploration Department, effective May 14, 1956. He replaced Ed J. Hamner, recently elected to the Board of Directors.

Mr. Buckley is a graduate of the University of Texas, where he received his B.S. and M.S. degrees in chemical engineering in 1932. He went to work for Humble the following year as a roustabout in the Conroe field, but was soon transferred to the Production Research Division in Houston, where he served progressively as research engineer, assistant division head, and acting division head. In 1942, he was named head of the Production Research Division, serving in that capacity until August, 1954, when he was appointed acting assistant chief geologist.

Mr. Buckley is an active member of the American Petroleum Institute, the American Institute of Mining, Metallurgical and Petroleum Engineers, and several other professional societies. He recently was awarded A.I.M.E.'s highest honor, the Anthony F. Lucas Gold Medal, with a citation: "For outstanding contributions as scientist, technologist, leader, and devoted labors as an author, bringing wide and general understanding of modern petroleum technology to the industry and the public."

Dr. Claude R. Hocott, who has been serving as acting division head during Mr. Buckley's absence, has been appointed head of the Production Research Division. Dr. Hocott has been with Humble since 1937, when he received his Ph.D. degree from the University of Texas. He became assistant head of the Production Research Division in 1942.

Wilmoth Appointed Northeast Division Sales Manager

George Wilmoth

George Wilmoth, a veteran of 27 years' service with Humble, has been named division sales manager of the Northeast Division. He succeeds R. V. Rea, who died April 14.

The new division manager has been with Humble since joining the Company as agent in Lufkin in 1929. Six years later, he was named local manager at Longview, and in 1947 became district salesman in the Northeast District and later East Texas district manager. Beginning in 1949, he served as Northeast Division operations manager and since last September has served as acting assistant Northeast Division manager.

Homer Bass, former manager of the East Texas District who has been Northeast Division acting operations manager, moves up to the position of Northeast Division assistant sales manager.

Sales Department Sets Safety Record

On April 26, Humble's Sales Department completed one full year without a disabling injury, working more than two million manhours without sustaining an injury that caused loss of time from the job.

A total of 1,063 employees, working all over Texas and in New Mexico, shared in the accomplishment.

In recognition of this outstanding achievement a safety plaque was presented to employees by the American Petroleum Institute.

"This is an outstanding achievement and one for which all Sales Department employees can feel justifiably proud," said Frank A. Watts, Humble sales manager. "It is an accomplishment made possible by cooperation from both employees and management."

The department has reached one million manhours without a disabling injury on five separate occasions in the past, but this is the first time it has completed two million manhours safely.

Humble Plans Radio-TV Football Coverage

Humble Oil & Refining Company again will sponsor radio broadcasts and telecasts of Southwest Conference football this fall. This marks the twenty-third straight year that the Company will sponsor radio broadcasts of the games, and the ninth straight year for televising a number of selected contests.

Plans this season include comprehensive Texas-wide coverage on radio, and television coverage consistent with the policies of the Conference and the National Collegiate Athletic Association.

The television program for 1956 includes six games: September 29, Baylor-Texas Tech; October 13, Texas-Oklahoma; October 20, Rice-SMU; November 3, Texas A&M-Arkansas; November 17, TCU-Texas; November 29, Texas-Texas A&M.

JA Companies Win Honors

Two Humble-sponsored Junior Achievement Companies in Houston and New Orleans recently won top national awards for their accomplishments during the 1955-56 school year. Both were judged the best companies in the nation in their individual categories.

The Handi-home Products Company of New Orleans which manufactured carry-all carts was judged first place winner in the iron and steel products division. The Metal Engineering Company of Houston won top honors in the aluminum category with their production of stadium seats.

World's Deepest Oil Well Completed

The Richardson & Bass, Mecom and Freeport No. 1-L Humble-L.L.&E., a wildcat located in the Lake Washington area of Plaquemines Parish, Louisiana, has been completed as the world's deepest oil well.

After drilling to a record depth of 22,570 feet, the well was completed through perforations between 21,419 and 21,465 feet. On potential test the well flowed at the rate of 207 barrels of 43-degree gravity oil per day through a 10/64-inch choke with a tubing pressure of 1125 pounds per square inch and a gas-oil ratio of 1179 cubic feet per barrel. The pay zone in this new discovery is some 4600 feet deeper than the previous depth record for oil production established by the Shell-Gonsoulin Minvielle-State Unit No. 2, Weeks Island field in South Louisiana, which began producing oil from 17,306 feet in 1953.

J. W. Old Is N.A.C.A. Vice President

John W. Old

John W. Old, head of the Budget and Financial Accounting Division of Humble's Houston Refining Accounting Office, has been elected National Vice President of the National Association of Cost Accountants. His election took place on June 25 in Chicago, at the National Convention of the N.A.C.A.

Mr. Old, who has been a Humble employee since 1928, is senior supervisory accountant in charge of financial and budgetary accounting for the Company's refinery and chemical products operations. He has been affiliated with the Houston Chapter of N.A.C.A. since 1939, and has served as chapter president (1946-47), vice president, director, and secretary. He was a National Director of N.A.C.A. in 1947-48.

The National Association has more than 40,000 members in 131 Chapters. As one of the eight National Vice Presidents, Mr. Old will serve also as a member of the organization's executive committee.

Austin Is Manager of Wholesale Sales

J. W. Austin

J. W. Austin has been named manager of Humble's wholesale sales. He was formerly manager of the northeast sales division with headquarters in Dallas, but moved to Houston in September, 1955, on training assignment in his present position.

As wholesale sales manager, Mr. Austin is in charge of all sales made at refinery, terminal and bulk station levels, other than sales through retail outlets.

Beginning his career with Humble in 1929 as a warehouseman in Jacksonville, Texas, Mr. Austin moved up successively to cashier, assistant agent, agent, district manager and division manager.

Recent Retirements

HUMBLE PIPE LINE COMPANY

Name	Location	Date of Retirement	Years of Service
Fred Bernhard	Refugio District	May 1	30
George A. DuBose	Ingleside Station	April 22	30
William V. Howell	Longview	April 30	22
Lloyd M. Surles	Cisco District Office	April 1	30
PRODUCTION DEPARTMENT			
John Bruce	Friendswood	May 22	22
Ivan C. Corbell	Flour Bluff Gas Plant	April 14	30
George W. Keen	Lovell Lake	June 4	33
Otto C. Lauhoff	Tomball Natural Gas System	June 1	30
BAYTOWN REFINERY			
Charles A. Bedinger	Power & Water Dept.	April 1	33
Arthur O. Briggs	Helper	June 2	27
Sam H. Brooks	Oil Straining & Blending	May 21	26
Allen P. Gieger	Pipe Fitter	June 4	33
Lucien L. Laird	Dehydro Plant	June 16	30
Walter E. Lauland	Butadiene Pumping & Gauging	May 13	31
James C. McNamara	Shop Foreman	May 8	32
Daniel H. Rogers, Sr.	Treating Dept.	May 6	25
Edward Timmins	Valve Mechanic	May 10	35
SALES DEPARTMENT			
Phillip O. Gibson	Houston Package Terminal	May 1	30
HOUSTON OFFICE			
Alida B. Gouger	Building Maintenance	April 16	20
Avelyn F. Hale	Production Operating	May 28	37
John Q. Weatherly	Law Department	June 1	30

Deaths

Employees: James R. Aldridge, 28, rotary helper at Grand Isle, on May 7; David W. Alpha, 59, chief clerk at Baytown Refinery, on April 19; Kenneth K. Birchard, 47, gas measurement supervisor at New Orleans, on April 11; Seab R. Canon, 63, compressor plant operator and gauger at Goose Creek, on April 25; Emil H. Ebel, 58, field gauger at Tomball, on April 24; Fred D. McMahon, 64, division superintendent at Midland, on April 16; William C. Phillips, 53, senior industrial gas service man at East Texas Division Gas Plant, on May 13.

Percy A. Portis, 50, helper 1st at Baytown Refinery, on April 29; Robert V. Rea, 45, sales manager of Northeast Texas Division, on April 12; Alfred H. Ricklefsen, 53, helper at Baytown Refinery, on May 20; Henry E. Sammons, 57, rotary driller at Athens, on May 21; Henry M. Syler, 60, operator at Baytown Refinery, on April 3; Kevin D. Thompson, 21, rotary helper at Grand Isle, on April 11; Joe W. Walker, 54, helper at Baytown Refinery, on April 6.

Annuitants: Knute Anderson, 66, former dockman helper at Baytown Refinery, on April 12; John A. Blackerby, 68, former office building maintenance supervisor at London, on April 19; Gardner K. DeLaune, 69, former handy repairman at Baytown Refinery, on April 3; Robert F. Dial, Sr., 66, former pipe fitter supervisor at Baytown Refinery, on May 12; Charlie Griffin, 63, former laborer at Baytown Refinery, on April 10; Henry Hammontree, 65, former lease pumper and gauger at London, on April 9; Paul J. Hemperley, 70, former carpenter at London on May 11; Joseph E. Reilly, 65, former general foreman at Baytown Refinery, on May 16; Ernest B. Salter, 69, former machinist 1st at Baytown Refinery, on April 29; James D. Williams, 66, former oiler at Hawkins Station, on April 30.

Behind this issue

● In the magazine business, space can be a stern taskmaster. Preparing for this issue, our writer in charge of Texas history had studied three important books and a round dozen reliable articles on the Comanche Indians. Later on, after he had written a first draft, the pressure of other material obliged him to compress his narrative into little more than one page.

Like throwing cargo overboard to lighten a sinking ship, he snipped one paragraph after another from the manuscript. Out came a stirring account of a Comanche buffalo hunt. Into the wastebasket floated an anecdote about the way the Indians used a scraggly little "sheep of a horse" to win a race from the best the U. S. Cavalry could offer at Fort Chadbourne. Scissors took their toll of the way youths of the tribe became the finest horsemen on the Great Plains. At the final paring, no room was left for warpaths and moonlight raids.

That, as it turned out, was the one objection raised by Professor Seymour V. Connor, of Texas Tech, who checked the story for historical accuracy. What good is an Indian story, he asked, without a bit of bloodletting?

In the end, we compromised by agreeing to dress up a future issue with eagle feathers, warpaint, and smoking muskets. Tentative title: "Warpaths of the Republic," an account of Indian troubles in 1840.

● Bob Wygant, this month's cover artist whose "Land of the Purple Sage" and "Dogwood Trail" grace the center section of this issue, often travels far and thoroughly to find just the scene to inspire his color-sensitive brush.

This spring, Bob bounced over many miles of West and Southwest Texas in search of purple sagebrush and wound through more miles of dogwood trails in the East Texas wood.

He found his sagebrush at the foot of the Anacacho Mountains off U. S. Highway 90 between Uvalde and Brackettville. The cowboy in the painting, incidentally, is one of several Bob met (Wygant doesn't remember his name or ranch) and talked with on the sagebrush safari.

Wygant spotted his dogwood scene just a mile outside Palestine on Dogwood Trail No. 1. Since "the bride of spring" blooms only about three weeks a year, Bob enlisted the service of the Humble Touring Service to notify him when blossom time reached a peak. Before he could get there, though, a Texas "norther" blew in and killed many of the milk-white blooms.

An interesting contrast in Wygant's subjects, besides the obvious geographic one, is their popularity. Dogwood, which was planted by Washington at Mount Vernon and Jefferson at Monticello, ranks with the magnolia among the popular flowering trees of the Southland.

Purple sagebrush, on the other hand, the prime ingredient of the Zane Grey-ish novel, has long been the nemesis of Western ranchmen, who want to eradicate the "weed."

● Like the busman on his holiday, you might expect the supervisor of the Humble Touring Service to spend his vacation time in travel. You'd be right.

At this writing, Walter E. Hill was in Billings, Montana, on a combination business-pleasure automobile trip he mapped for himself. In bygone years, he travelled thousands of Texas miles for the Sales Department before he was called in to inaugurate the Touring Service in 1933. (See pages 10-12.) And until recent years, he toured yearly, and extensively, in Mexico.

Travel-wise Hill also turns out to be Botanist Hill. He likes to spend his spare moments in the study of pecan tree propagation on his farm near Sealy, Texas. "What I do," he explains, "is take a wild, native pecan tree and try to make it produce large, paper-shelled nuts. Nature, of course, does most of the work."

The farm, by the way, is only 40 miles from Houston and the path, short and often-trodden, doesn't give the staff at Humble Touring Service much business from their boss. But they manage to keep busy anyway, as the article on page 10 will show.

The Humble Way

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MAY-JUNE

1956

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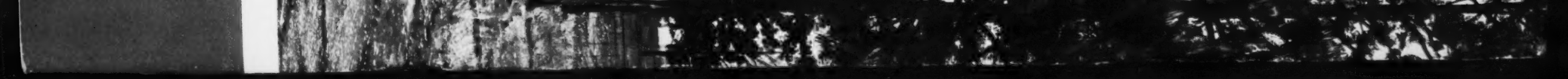
Wall of new cans, soon to be filled with Humble Uniflo Motor Oil, resembles giant honeycomb in this picture made at Baytown Refinery.

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